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| **COURSEWORK ASSIGNMENT** | |
| **Module Title: Platforms for Computing – Sem B** | **Module Code: 4WCM0019** |
| **Assignment Title: Assignment 1 – CPU Programming – HW Components and Subsystems** | **Individual Assignment - Yes** |
| **Tutor**: Gani Nashi | **Internal Moderator**: |

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| Marks Awarded %: | Marks Awarded after Lateness Penalty applied %: |
| Penalties for Late Submissions   * Late submission of any item of coursework for each day or part thereof (or for hard copy submission only, working day or part thereof) for up to five days after the published deadline, coursework relating to modules at Levels 0, 4, 5, 6 submitted late (including deferred coursework, but with the exception of referred coursework), will have the numeric grade reduced by 10 grade points until or unless the numeric grade reaches or is 40. Where the numeric grade awarded for the assessment is less than 40, no lateness penalty will be applied. * Late submission of referred coursework will automatically be awarded a grade of zero (0). * Coursework (including deferred coursework) submitted later than five days (five working days in the case of hard copy submission) after the published deadline will be awarded a grade of zero (0). * Where genuine serious adverse circumstances apply, you may apply for an extension to the hand-in date, provided the extension is requested a reasonable period in advance of the deadline. | |
| Please refer to your student handbook for details about the grading schemes used by the School when assessing your work. Guidance on assessment will also be given in the Module Guide. | |
| Guidance on avoiding academic assessment offences such as plagiarism and collusion is given at this URL: <http://www.studynet.herts.ac.uk/ptl/common/LIS.nsf/lis/citing_menu> | |

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| **ASSIGNMENT BRIEF**  ***Students, you should delete this section before submitting your work.*** | | |
| **This Assignment assesses the following module Learning Outcomes (from the module DMD):**  Successful students will typically:   * have a knowledge and understanding of:   1. The way in which computing platforms use and manipulate data.   2. The structures in computing platforms and how they relate to each other. * be able to:   1. Articulate concepts related to computing platforms, devices and end user software.  1. Demonstrate an understanding of how computing platforms use and manipulate data. | | |
| **Assignment Brief:**  **Assignment 1 Task 1**  Your team of IT consultants has been approached by the Training and Development department of a client organisation to prepare an electronic poster in an appropriately chosen format, displaying the main components and subsystems of a computer system, and how they interact. A poster cannot display all the information, but only the necessary one for each component. The rest of the information for each part of the poster will be provided as notes. The notes should be prepared in the mindset that the poster will be presented to a panel from the client organisation that ordered the poster. You might not be the person who will present the poster, so your notes should be exhaustive for the person who will present it.  The poster will include the following topics:   * An explanation of the Von Neumann architecture components and the interaction between the main subsystems. These explanations need to include even the advantages that the Von Neumann architecture provided to the manufacturing of computers and programmers * An explanation of memory hierarchy, why the memory types are ranked that way, and why they are used in different components of the Von Neumann * An explanation of Direct Memory Access and how it increases the efficiency of CPU usage (with an input/output example)   The poster must be uploaded on the Canvas repository for Assignment 1, with the title “CW1\_Computer\_Architecture\_Your\_UH\_ID”, and it will be accompanied by the necessary explanatory notes.  Notes should be properly referenced, in Harvard format, to demonstrate the research that you have undertaken as part of the work.  **Assignment 1 Task 2**  Using the CPU Simulator software provided, you will need to write in assembly language some CPU instruction sets, whose functionality is explained below. Your task is as follows:     1. You are given an initial instruction set which controls the snake moving through the maze. The program works by moving the snake up to a certain point and it stops. You need to make the necessary corrections to make the snake moving cleanly through the maze. At this point, you will save the program .ASM file as CW1\_Snake1\_Your\_UH\_ID.ASM. It is easy to see that code is badly commented, with meaningless dry comments. You need to change them to full code explanations, for programming beginners.   ; ===== CONTROL SNAKE AND MAZE =============================  Start:  MOV AL,FF ; Special code to reset the snake.  OUT 04 ; Send AL to port 04 to control the snake.  MOV AL,4F ; 4 means DOWN. F means 15.  OUT 04 ; Send 4F to the snake  OUT 04 ; Send 4F to the snake  OUT 04 ; Send 4F to the snake    JMP Start  END    ; ===== Program Ends =======================================   1. For the second part of the task you need to make the snake program efficient, by using procedures and loops. You will save this second improved program as CW1\_Snake2\_Your\_UH\_ID.ASM 2. Take screenshots of the program as you run it step-by-step and use the screenshots to prepare a short tutorial, where you explain how you built the program, and what it does. The tutorial should be aimed at an audience that are assembly programming beginners. That is the only assumption that you can make.   **Assignment 1 Task 3**  Write a report on the following topics:   * A review for the Task 2 of this assignment, the Snake and Maze programming, to evaluate the performance of the CPU, based on its speed, RAM speed and size, and architecture * Complete the Activity - Fetch-Decode-Execute cycle using the handout and explain your solution. (you can use your own drawings, or screenshots from your notes). Look at the task handout for more details. * An explanation with diagrams, in your own words, of CPU (ALU) mathematical operations. | | |
| **Submission Requirements:**  Your deliverables for Tasks 1, 2, and 3 will be:   * A poster for Task 1 in an appropriate format that can impress your “client” * Two text files in .asm format which will include the commented code for Task 2 Snake and Maze programs * A technical report, with a professional title page, including the following parts:   + Part I – Explanatory notes for the poster   + Part II – A tutorial (for Task 2) in an appropriate format of your choice, which will include step-by-step explanations with screenshots of how you built and improved the Snake and Maze program and how it works. The explanations can be written as notes underneath each screenshot. Every screenshot must be properly explained.   + Part III – a technical report including the fully explained solutions to the Activity Fetch-Decode-Execute Cycle, and the CPU operations, such as the ALU mathematical operations. | | |
| **Marks awarded for:**  This assignment is worth **20%** of the overall mark for this module.  The table below shows the word count and the weighting percentage for each section of the submission:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Section** | **Computer Components Poster (with notes)**  **(25%)** | **Snake and Maze Program**  **(25%)** | **Tutorial about Snake and Maze**  **(20%)** | **Explanation of the solution to the Fetch-Decode-Execute Cycle (20%)** | **ALU Operations**  **(10%)** | **Total** | | **Indicative Word count** | 400 | N/A | 400 | 300 | 200 | 1300 | | **Weighting %** | 25 | 25 | 20 | 20 | 10 | 100 |   A note to the Students:   1. For undergraduate modules, a score above 40% represent a pass performance at honours level. 2. For postgraduate modules, a score of 50% or above represents a pass mark. 3. Modules may have several components of assessment and may require a pass in all elements. For further details, please consult the relevant Module Guide or ask the Module Leader. | | |
| Typical (hours) required by the student(s) to complete the assignment:  hours | | |
| **Date Work handed out:**  **w/c 01/02/2021** | **Date Work to be handed in:**  01/03/2021 | **Target Date for the return of the marked assignment:**  30/03/2021 |
| **Type of Feedback to be given for this assignment:**  Summative feedback will be given for the test on StudyNet, on the submission area within four weeks after you have completed the test and have submitted the evidence of test completion (screenshot) on StudyNet. | | |

Please refer to the marking scheme in the next section:

**PfC Assignment 1 Marking Scheme**

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| Numeric Score | Descriptor | Computer Components Poster (with notes)  (25%) | Snake and Maze Program  (25%) | Tutorial about Snake and Maze  (20%) | Explanation of the solution to the Fetch-Decode-Execute Cycle (20%) | ALU Mathematical Operations  (10%) |
| 80-100 | Outstanding  (1st) | Outstanding presentation and clarity. No grammatical / spelling or structural errors. Ideas presented with exceptional clarity. The elements of the poster are described using an outstandingly structured layout, written with outstanding skill level. | Outstanding low-level programming skills and an outstanding level of knowledge of how the CPU can be manipulated according to an application’s requirements.  Interaction between components are outstandingly understood. | Outstanding level of descriptions, great level of knowledge. Tutorial shows deep understanding of a beginner’s needs, and outstanding level of writing, | The Fetch-Decode-Execute cycle has been greatly understood, and the solution is not only accurate, but it is also explained with outstanding level of practical skills, and it is written at a high level. | Outstanding knowledge of ALU operations, and they are explained with great technical skills. |
| 70-79 | Excellent  (1st) | Excellent level of presentation and clarity. No significant grammatical / spelling or structural errors. Ideas presented with excellent skill. The elements of the poster are described using an excellently structured layout, written with excellent skill level. | Excellent low-level programming skills and excellent knowledge of how the CPU can be manipulated according to an application’s requirements.  Interaction between components are excellently explained. | Tutorial is written with excellent level of descriptions, and excellent level of knowledge. It shows excellent understanding of a beginner’s needs, and demonstrates excellent level of writing, | The solution to the Fetch-Decode-Execute cycle activity is excellent, completed with accuracy, and is explained with excellent level of practical skills. It is written at a high technical and academic level. | Excellent knowledge of ALU operations, and they are explained with excellent technical skills |
| 60-69 | Very good  (2:1) | Very good level of presentation and clarity. Some grammatical / spelling or structural errors. Ideas presented with very good skill. The elements of the poster are described using a very well-structured layout, written with very good skill. | Very good knowledge of low-level programming and very good skills in manipulating the CPU, according to an application’s requirements.  Interaction between components are very well explained. | Tutorial is written with very good level of descriptions, and very good level of knowledge. It shows very good understanding of a beginner’s needs and demonstrates very good level of writing skills. | The solution to the Fetch-Decode-Execute cycle activity is very good, completed with a very good degree of accuracy, and is explained with a very good level of practical skills. It is written at a very good technical and academic level. | Very good knowledge of ALU operations, and they are explained with very good technical skills |
| 50-59 | Good  (2:2) | Good level of presentation and clarity. A few grammatical / spelling or structural errors. Ideas presented with good skill. The elements of the poster are described using a well-structured layout, written with good skill. | Good knowledge of low-level programming and good skills in manipulating the CPU, according to an application’s requirements.  Interaction between components are well explained. | Tutorial is written with good level of descriptions, and good level of knowledge. It shows good understanding of a beginner’s needs and demonstrates good level of writing skills. | The solution to the Fetch-Decode-Execute cycle activity is good, completed with a good degree of accuracy, and is explained with a good level of practical skills. It is written at a good technical and academic level. | Good knowledge of ALU operations, and they are explained with good technical skills |
| 40-49 | Satisfactory  (3rd) | Satisfactory level of presentation and clarity. Many grammatical / spelling or structural errors. Ideas presented with satisfactory skill. The elements of the poster are described using a satisfactorily-structured layout, written with satisfactory skill. | Satisfactory knowledge of low-level programming and satisfactory skills in manipulating the CPU, according to an application’s requirements.  Interaction between components are satisfactorily explained. | Tutorial is written with satisfactory level of descriptions, and satisfactory level of knowledge. It shows satisfactory understanding of a beginner’s needs and demonstrates satisfactory level of writing skills. | The solution to the Fetch-Decode-Execute cycle activity is satisfactory, completed with a satisfactory degree of accuracy, and is explained with a satisfactory level of practical skills. It is written at a satisfactory technical and academic level. | Satisfactory knowledge of ALU operations, and they are explained with satisfactory technical skills |
| 30-39 | Marginal fail  (Fail) | Unsatisfactory  level of presentation and clarity. Too many grammatical / spelling or structural errors. Ideas presented with unsatisfactory skill. The elements of the poster are described using a unsatisfactorily-structured layout, written with basic skill. | Unsatisfactory knowledge of low-level programming and unsatisfactory skills in manipulating the CPU, according to an application’s requirements.  Interaction between components are unsatisfactorily explained. | Tutorial is written with unsatisfactory level of descriptions, and unsatisfactory level of knowledge. It shows unsatisfactory understanding of a beginner’s needs and demonstrates unsatisfactory level of writing skills. | Unsatisfactory solution to the Fetch-Decode-Execute cycle activity, completed or partially completed, with an unsatisfactory degree of accuracy, and is explained with an unsatisfactory level of practical skills. It is written at an unsatisfactory technical and academic level. | Unsatisfactory knowledge of ALU operations, and they are not explained with satisfactory technical skills |
| 20-29 | Clear fail  (Fail) | Some limited poster, with unsatisfactory, limited explanations.  Some attempt with basic structure and writing style, but not enough to be satisfactory. | Very limited attempts on the CPU program, and a solution has not been provided. Very limited description of CPU and other components | A few descriptions of the steps.  Little understanding of user needs. | Limited attempt on providing a solution. Clear lack of understanding. | Limited knowledge of ALU operations, and they are not clearly explained. Many technical errors in explanations. |
| 0-19 | Nothing of merit  (Fail) | Very limited attempt to poster development, with no structure, very limited explanations of ideas.  Very difficult to follow. Too many grammatical and spelling errors. References list has incorrect citations and/or is not the recommended format. No reference list included. | Very limited attempt to write some assembly code. No descriptions. | Little or no evidence provided. | Very limited or no evidence of work in this section. No solution, or complete lack of understanding of the cycle. | Little or no attempt is made on the topic. |